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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Gerd Scheying

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EXAMINER

OLSEN, KAJ K

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

09/14/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/825,571	Applicant(s) SCHEYING ET AL.	
	Examiner KAJ K. OLSEN	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 July 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1795

DETAILED ACTION

Response to Amendment

1. In view of the appeal filed on 7/8/2010 and the new art the examiner is including herein, PROSECUTION IS HEREBY REOPENED. A new grounds of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Nam X Nguyen/

Supervisory Patent Examiner, Art Unit 1753.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 1795

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie et al (US 2001/0005137) (hereafter "Horie '137") in view of Horie et al (US 2002/0113596) (hereafter "Horie '596") and Discenzo (USP 6,286,363). Discenzo is being cited and relied on for the first time with this office action.

4. With respect to claim 1, Horie '137 discloses a potentiometric sensor device for measuring a pH value comprising a substrate comprising two electrodes positioned on the substrate, where the two electrodes are of a comb structure (par. 0019), and further discloses an evaluation circuit (i.e. pH meter) in communication with the electrodes where the evaluation circuit is configured to detect a degradation process of a motor oil based on the potentiometric response of the two electrodes. See par. 0009, 0010, and 0021. With respect to the use of thick film technology for constructing the electrodes, the determination of patentability for the claim is based on the product itself. Because the product of the claim is identical to the invention of Horie '137, the process from which it was made is the same as or obvious over the process utilized by Horie '137 (see *In re Thorpe*, 777 F.2d 695, 698). Horie '137 does not explicitly disclose that the comb shaped electrodes are interdigital or that the evaluation circuit is disposed on the substrate. With respect to the interdigitation, Horie '596 disclosed an alternate configuration of comb shaped electrodes and taught interdigitating the electrodes to minimize the distance between the electrodes so as to improve the accuracy of the pH sensing probe. See fig. 1 and 19 and par. 0126. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to interdigitate the electrodes of Horie '137 as suggested by Horie '596 so as to minimize the distance between the electrodes and thereby maximize the accuracy of

Art Unit: 1795

the pH oil probe. With respect to the evaluation circuit being disposed on the substrate, Discenzo discloses an alternate oil sensor employing a pH sensor (col. 6, ll. 30-39 and col. 19, 34-43) and discloses that the processor for evaluating the data can be included onto the substrate containing the electrodes allowing the sensors and data processing to be entirely integrated (fig. 5b and col. 18, ll. 45-64). Because Horie '596 already recognized that the circuitry 381 for the oil sensor can be located adjacent to the actual oil sensor (fig. 34 and par. 0174), it would have been obvious to one of ordinary skill in the art at the time the invention was being made to also utilize the substrate of Horie '137 that the electrodes were mounted to as a location for the evaluation circuit, as suggested by Discenzo, in order to facilitate the device integration and to minimize the number of substrates needed for the sensor. Moreover, locating the processing circuitry near the electrodes would minimize the distance between the sensing and the data processing thereby minimizing signal loss between the sensor and data processing.

5. With respect to claim 2, see Horie '596 par. 0123.

6. With respect to claim 3, Horie '596 show electrodes that are spaced at intervals around 100 and 200 μm (i.e. 0.1 and 0.2 mm) provided high accuracy pH sensing (par. 0126 and fig. 19). It would have been obvious to utilize a distance in the range of 160-200 μm for the sensing electrodes of Horie '137 because distances in that range appear to provide 97-98 % accuracy.

7. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie '137 in view of Horie '596 and Discenzo as applied to claim 3 above, and further in view of Tani et al (USP 5,904,987).

8. With respect to claims 4 and 5, Horie '137, Horie '596, and Discenzo set forth all the limitations of the claim, but did not explicitly recite the use of a glass ceramic as the substrate.

Art Unit: 1795

Tani teaches that glass ceramic composites were a known alternative to materials such as alumina (one of the suggested substrates of Horie '137 (par. 0019)), and Tani further discloses that glass ceramic composites had the added advantage of being sinterable at lower temperatures. See col. 1, ll. 14-40. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Tani for the sensor device of Horie '137, Horie '596, and Discenzo because the substitution of one known substrate material for another requires only routine skill in the art. Moreover, because the substrate of Tani requires lower temperature sintering, the various electrodes of Horie '137 could have been deposited onto the substrate before firing thereby allowing the use of the technologies such screen printing onto ceramic green sheets for the construction of the sensor of Horie '137. With respect to the glass ceramic being in the form of a foil, the use of foils or tapes of ceramic materials requires only routine skill in the art. With respect to the material having high mechanical strength, absent a particular definition of the level of mechanical strength being sought, the presumption is that the glass ceramic materials of Tani meet the broadly defined high mechanical strength of the claims.

9. With respect to claim 6, see Horie '137 par. 0028.

10. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie '137 in view of Horie '596, Discenzo, and Tani as applied to claim 6 above, and further in view of Kato et al (USP 5,320,735) and Carter et al (USP 5,126,034).

11. The references set forth all the limitations of the claims, but did not explicitly disclose that the two electrodes are made of silver and iridium oxide. In particular, although Horie '137 recognize the use of metal oxides as the pH sensitive material (par. 0028) and further recognized the use of Ag as a reference electrode when combined with AgCl (par. 0021), Horie '137 did not

Art Unit: 1795

explicitly disclose the use of iridium dioxide as the sensitive metal oxide and didn't explicitly utilize one of its comb electrode as a Ag based reference electrode. With respect to the use of iridium dioxide, Kato teaches that that is a well known metal oxide with pH sensitivity (col. 4, ll. 52-66). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Kato for the sensor device of Horie '137, Horie '596, Discenzo, and Tani because the substitution of one known metal oxide electrode for another requires only routine skill in the art. With respect to the use of Ag as a reference electrode, Carter like Horie '137 teaches of silver and silver halide, and Carter further discloses that an electrode of an interdigital comb may be silver/silver chloride (see column 3, lines 28 - 31). Because Carter demonstrates that a reference electrode constructed of Ag/AgCl can be constructed as an interdigitated electrode and because Carter discloses that Ag/AgCl is "especially preferred", it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Carter and construct one of the comb electrodes of Horie '137 as a Ag reference electrode because a Ag/AgCl electrode would be a more stable reference potential for the pH sensor. See fig. 2 and par. 0022 of Horie '137 where it states that its non-Ag/AgCl reference electrode is only "satisfactory".

12. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie '137 in view of Horie '596 and Discenzo as applied to claim 1 above, and further in view of Radford et al (USP 3,843,400).

13. The references set forth all the limitations of the claims, but the electrodes are not disclosed as being made from the paste compositions of claims 9 - 13.

Art Unit: 1795

14. Regarding claims 9 and 10, Radford teaches making electrodes from paste (see col. 5, ll. 30-35), wherein, in order to improve adhesion (see col. 2, ll. 17-20) between the electrodes and the substrate, the pastes include an inorganic material of 10% (see col. 5, l. 26).

15. Regarding claim 11, Radford teaches the inorganic material corresponds to the substrate (see col. 4, ll. 24 - 26 and col. 7, l. 13 - col. 8, l. 24).

16. Regarding claims 12 and 13, Radford teaches the pastes are made of a powder mixture of electrode material and inorganic material (see col. 7, ll. 30-35 and col. 5, ll. 25-28) and a carrier material (see col. 7, l. 35 - col. 8, l. 10). As taught in col. 7, l. 35 - col. 8, l. 10 there may be up to 30% solvent plus small amounts of other carrier substances, meaning that the amount of powder taught overlaps the 10% to 70% claimed. It would have been obvious to one of ordinary skill the art to have made the electrodes of Horie '137 in accordance with the teachings of Radford, because Radford explains in column 2, lines 16 - 20 that the electrodes adhere better to the underlying substrate.

17. Claims 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie '137 in view of Horie '596 and Discenzo as applied to claims 1 and 3 above, or Horie '137 in view of Horie '596, Discenzo, and Tani as applied to claim 4 above and further in view of Ushizawa et al (USP 4,582,589) and/or Hobbs et al (USP 5,522,980).

18. With respect to the claims, the references set forth all the limitation of the claims, but did not explicitly disclose the presence of a hydrous layer on the two electrodes. Ushizawa teaches an alternate pH electrode and discloses that a layer 14 can be placed over a pH electrode so as to protect the electrode to protect the electrode from contamination from large and medium sized molecular weight compounds while still providing the desired hydrogen ion transport. See col.

Art Unit: 1795

3, ll. 7-19. One of the disclosed polymers is hydroxyethyl methacrylate which is a known hydrophilic (i.e. hydrous) polymer. Hobbs teaches an alternate sensor having interdigitated electrodes and teaches that a porous protective layer constructed of polyimide can be utilized over the interdigitated electrodes to protect the electrodes. See fig. 2 and col. 5, ll. 47-51.

Applicant evidences with claims 15 and 17 that polyimide is a hydrous polymer. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of either Ushizawa or Hobbs for the sensor device of Horie '137, Horie '596, and Discenzo so as to protect the electrodes from contamination or damage. With respect to the use of the polymer of Ushizawa over both of the electrodes of Horie '137, that would have been obvious because both of the electrodes would have been susceptible to contamination.

Moreover, Hobbs already demonstrates that protective layers should be deposited over both of the electrodes of an interdigitated pair of electrodes.

19. With respect to Ushizawa and the use of polyimide or polyamide, Ushizawa disclosed no criticality for its choice of protective polymer. Moreover, the present invention appeared to establish no criticality for its choice of polyamides or polyimides (specification, p. 7, ll. 14-24). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize other known hydrous polymers for the protective layer of Ushizawa, including the use of polyamides or polyimides, because the substitution of one known polymer for another requires only routine skill in the art. Furthermore, Hobbs already demonstrated that polyimide is a known material useable for protective layers for sensor electrodes.

Art Unit: 1795

20. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horie '137 in view of Horie '596 and Discenzo as applied to claim 1 above, and in further view of Hornberger (US 1,956,741).

21. The references set forth all the limitations of the claim, but did not explicitly state that the evaluation circuit is configured to normalize a pH measurement in response to different operating states of motor oil. The present specification gives different temperatures as an example of different operating states (see p. 8, ll. 4-6). Hornberger teaches compensator (R2) "to automatically compensate the electrode circuit for variations in the pH value due to temperature changes" (page 4, lines 56 - 60). It would have been obvious to one of ordinary skill in the art to have configured the evaluation circuit of Horie '137, Horie '596 and Discenzo to normalize a measurement in response to different temperatures as taught by Hornberger to achieve accurate results (see p. 4, ll. 56-60).

Response to Arguments

22. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 6:00-2:30.

Art Unit: 1795

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795

September 8, 2010